RUNNING HEAD: Structural competition in L2 production

Structural competition in second language production: Towards a constraint-satisfaction model*

This paper is published in *Language Learning* as:

Austin, G., Pongpairoj, N. and Trenkic, D. (2015), Structural competition in second language production: Towards a constraint-satisfaction model. *Language Learning*, 65(3), 689–722. doi: 10.1111/lang.12108

Gavin Austin, University of Southern Queensland, Australia
Nattama Pongpairoj, Chulalongkorn University, Thailand
Danijela Trenkic, University of York, UK

* This research was supported by the University of York and by National Research University Project, Office of Higher Education Commission in Thailand (WCU-068-HS-57). We wish to thank Jelena Mirkovic for useful discussions, Heather Goad for advice on phonological matters and Leah Roberts for help on statistics. We are grateful to Annie Clarke for her assistance in recruiting and testing the participants. Versions of this paper were presented at the 9th International Symposium on Bilingualism (ISB 9) and the 22nd Annual Conference of the European Second Language Association (EUROSLA 22). We thank the audiences at these meetings for their constructive suggestions. We also thank the anonymous reviewers for their helpful feedback and to the editor for his thorough guidance in revising the manuscript. All remaining errors are our own.

Address for correspondence:
Danijela Trenkic
Department of Education
University of York
York, YO10 5DD
United Kingdom
Phone: + 44 (0)1904 433 461
Email: danijela.trenkic@york.ac.uk

Structural competition in second language production: Towards a constraint-satisfaction model

Structural competition in second language production: Towards a constraint-satisfaction model

Abstract

Second language (L2) learners often show inconsistent production of some aspects of L2 grammar. One view, primarily based on data from L2 article production, suggests that L1- and L2-licensed grammatical patterns compete for selection leading to variability in L2 functional morphology production (Trenkic, 2009). Here we show that the idea of structural competition has broader applicability, in correctly predicting certain asymmetries in the production of both *the* and plural *-s* by Thai learners of English. At the same time, we recognise that learners' growing sensitivity to structural regularities in the L2 might be an additional contributing factor, and therefore make a novel proposal for how the L1-L2 structural competition model and the sensitivity-to-L2-structural regularities account could be integrated and their respective contributions studied under the constraint-satisfaction model of language processing (Trueswell & Tanenhaus, 1994). We argue that this approach is particularly suited to studying bilingual processing as it provides a natural framework for explaining how highly disparate factors, including partially activated options from both languages, interact during processing.

Introduction

Late second language (L2) learners often find mastering the grammar of another language to be a difficult task (DeKeyser, 2005; Johnson & Newport, 1989). Inconsistent production of at least some aspects of grammar may persist even after years of L2 learning and of daily use (Han, 2009; Lardiere, 2009; White, 2003). One of the central tasks of L2 research is to explain why learning and using L2 grammar poses such a challenge. A factor that is often shown to have a contributing effect on L2 production, and the one we focus on in this study, concerns the properties of the learner's first language (L1) (e.g., Luk & Shirai, 2009). In this paper, we explore the issue of variable production of L2 functional morphology by focusing on two grammatical properties of the English nominal phrase: the use of the definite article (*the*), and of the regular plural (formed by adding *–s* to the singular form of a noun, e.g., *cats*). We study their production by Thai learners, an L2 population whose L1 lacks both articles and nominal plural marking.

The point of departure for our study was an explanation for variability in L2 functional morphology production which takes L1 transfer as an important factor, and has stemmed from studying L2 article use. Trenkic (2009) and Trenkic and Pongpairoj (2013) suggest that, for L2 learners from article-lacking L1 backgrounds, the L2-licensed (Art + N) and L1-licensed (bare noun) forms of a target noun-phrase (NP) compete with each other for selection, and that this competition leads to variability in production. Particularly, in cognitively more demanding contexts, the more established (i.e., article-less) form of the NP will be more likely to be selected.

In this study, we investigated the possibility that the idea of competition between forms of a target NP might have broader applicability. Our specific objective was to determine if the complexity of the immediate linguistic context might have an effect on the production of

plurals as well as definite articles, when the L1 lacks grammatical markers for both of these properties.

The problem: articles and plurals

In English and many other languages, nouns must be marked for plurality whenever reference involves more than one entity (as in the contrast *A cat is hungry* vs. *Cats are hungry*). When reference is to a singular countable entity, the noun must be preceded by an article (*a/the*); when the referent exists and is unique in a domain mutually manifest to speaker and hearer, a definite article must precede the noun (*The cat is hungry* vs. *A cat is hungry*).

A large number of studies have explored variability in the production of articles and plurals in L2 English (see below). This interest has arisen for several reasons. Nominals needing marking for definiteness and/or number occur in most, if not all, sentences in English, creating contexts in which errors in L2 production can, and do, frequently occur. Thus, understanding the mechanisms by which L2 articles and plurals are produced is an important component of understanding L2 production more generally, and, by implication, the knowledge that is involved in it. Moreover, how articles and plurals are acquired and produced by L2 users is relevant to several contentious issues within the study of L2 acquisition, including the extent of L1 influence and whether a recovery from L1 transfer is ever possible.

Many languages lack grammatical markers of definiteness or number (or both), and previous research suggests that learners from these L1 populations experience more problems with English articles and/or plurals than learners whose L1s mark these concepts grammatically. For example, in a systematic review of studies looking at the order in which a

broader range of functional morphemes are acquired, Luk and Shirai (2009) show that English learners from L1s which do not mark definiteness and plural, such as Chinese, Japanese and Korean, acquire these grammatical morphemes later than Spanish learners of English, whose L1 does mark these categories, and later than the 'natural order' hypothesis (Krashen, 1977) would predict. Other studies that directly compared L2 populations with and without articles/plurals in their L1s reveal essentially the same findings. All other variables being equal, learners from article-lacking L1s seem to produce English articles less consistently than learners from L1s that have an article system, and the same holds for plural marking when comparing learners whose L1s do not grammatically mark plural on nouns with learners whose L1s do (for articles, see the comparison of Chinese and Spanish learners in Díez-Bedmar & Papp, 2008; Finnish and Swedish in Jarvis, 2002, and Ringbom, 1987; Japanese and Spanish in Snape, 2006; Russian and Spanish in Chrabaszcz & Jiang, 2014; Thai and French in Pongpairoj, 2008, and Pongpairoj & Trenkic, 2013; for plurals, see the comparison of Chinese [no plural] and Czech and Polish [plural L1s] learners in Young, 1991).

Finally, the sheer number of studies that document article and plural difficulties of L2 populations that do not have these categories in their L1s speaks for itself (for articles, see Leung, 2002, Robertson, 2000, and Tryzna, 2009, for L1 Chinese; Žegarac, 2004, for Croatian; Young, 1995, for Czech; Butler, 2002, Hakuta, 1976, and Kuribara, 1999, for Japanese; Ionin, Ko & Wexler, 2004, for Korean and Russian; Avery & Radišić, 2007 and Trenkic 2002, 2004, 2007, for Serbian; for plurals, see Bialystok & Miller, 1999, Bliss, 2006, Jia, 2003, Jiang, 2004, Johnson & Newport, 1989, Lardiere, 2009, and Young, 1988, for L1 Chinese; Austin, 2014, and Yeni-Komshian, Robbins & Flege, 2001, for L1 Korean; Mellow & Cumming, 1994, for L1 Japanese; Charter, Dao & Jensen, 2012, and Dao, 2007, for L1 Vietnamese). In comparison, few studies focused on English articles and plurals in

production of L2 populations that have corresponding systems in their L1s – and when they did, far fewer problems were identified (e.g., García-Mayo, 2009).

In sum, the available literature strongly suggests that L2 production of English articles and plurals is negatively affected by the absence of corresponding markers in the L1. The aim of the present study was to explore the mechanisms that underpin this production disadvantage, in the hope that it may contribute to a better understanding of L2 functional morphology more generally. In the next section, we look at one particular account of variability in the production of L2 functional morphology with specific reference to L2 article production, which serves as a departure point for our study.

The L1-L2 structural competition account

Two basic theoretical assumptions underlie our research. First, language learning involves both contingency learning of constructions that relate meanings which are to be expressed to forms that express them and learning of the strength of these associations. On this view, grammars emerge through "piecemeal learning of many thousands of constructions and the frequency-based abstractions of regularities within them" (Ellis, 2004, p. 51).

Second, two languages in a bilingual speaker are often simultaneously activated and compete for selection, even when only one language is used. This language non-selectivity has been predominantly demonstrated in lexical processing (Gollan, Montoya, Cera & Sandoval, 2008; Kroll & Steward, 1994; Marian & Spivey, 2003; Weber & Cutler, 2006), but some recent research also suggests parallel activation of syntactic structures in bilingual processing, both in comprehension (Sanoudaki & Thierry, 2014) and in production (Runkqvist, Gollan, Costa & Ferreira, 2013). Earlier research on cross-linguistic priming (Hartsuiker, Pickering & Veltkamp, 2004; Hartsuiker & Pickering, 2008; Shin &

Christianson, 2009) and transfer in sentence processing (MacWhinney, 2005) lends further support for L1-L2 structural co-activation in on-line processing.

In a series of publications, Trenkic and collaborators extend the idea of cross-linguistic competition to morphosyntax (Trenkic, 2009; Trenkic & Pongpairoj, 2013; Trenkic, Mirković & Altmann, 2014). Their model argues that variability in L2 article production stems directly from structural competition between L1- and L2-licensed forms for encoding referential expressions. For example, in reference to a uniquely identifiable countable referent, for L2 speakers of English from L1 backgrounds where bare nominals can be used, there will be competition in production between the well-established L1-licensed bare N structure and the newly-learned L2-licensed Art + N structure (e.g., between *cat* and *the cat*). In other words, even though these learners may have formed a new, L2-licensed association that maps identifiable countable referents onto the Art + N structure in English, the strength of this association will suffer because of an already existing, L1-licensed association of identifiable countable referents with bare nominals, with which it competes in production. This competition between the L1- and L2-structures leads to variability: sometimes the L2-appropriate Art + N option will be selected, while at other times the L1-appropriate bare nominal structure will be used.

The model also predicts that when cognitive resources are depleted by concurrent task demands, the L1-licensed (i.e., article-less) form of the NP will be more likely to be selected than in less demanding contexts. Because more entrenched L1-licensed options can easily override newly-established L2 alternatives, L1-licensed options need inhibiting in production so that the correct option can be selected – a process which requires cognitive resources. The more depleted are the resources by other concurrent demands, the more difficult it is to

suppress the unwanted, L1-licensed competitors.[1] Finally, the model stipulates that the knock-on effect of this competition, and of the premium it puts on cognitive resources, is difficulty in integrating syntactic (*Is an article required?*) and pragmatic (*Is this article appropriate in the context?*) information. This means that the L1-L2 competition leads not only to article omission but to inconsistent article choices as well, for instance, in the form of substitution errors (see Trenkic, 2009, for an extended discussion).

The structural competition model straightforwardly explains some well-attested patterns of L2 article production from previous literature, including the tendency for articles to be omitted more when a noun is premodified by an adjective (Art + Adj + N; e.g., *the white cat*) than in non-modified noun phrases (Art + N; e.g., *the cat*) (Goad & White, 2004; Jarvis, 2002; Pongpairoj, 2008; Sharma, 2005; Snape, 2006; Trenkic, 2002, 2007, 2009; Young, 1995). In the model, as a sequence with an extra element, Art + Adj + N requires more processing resources than the simpler Art + N structure, leaving fewer resources available for suppressing the article-less L1 alternative. Consequently, the probability of selecting this alternative (i.e., dropping an article) is higher in the Art + Adj + N context than in the simpler Art + N one, all other things being equal.

The structural competition model (as outlined above) could be used to make further predictions both for L2 article production and for other functional morphemes. For example, if a higher rate of article omissions in Art + Adj + N contexts, compared to Art + N contexts, is due to the structural complexity of the former, making the L1-override more difficult, one

[1] Thomson-Schill and colleagues document the competition/selection issue in the domain of lexical access in monolingual language processing (e.g., Bedny, Hulbert & Thompson-Schill, 2006; Kan & Thompson-Schill, 2004; Thompson-Schill, D'Esposito, Aguirre & Farah, 1997). The cases where several possible contenders for production exist require greater inhibition, so that all but one option may be selected from the cluster. Thus, larger sets of items lead to more exaggerated response times and, crucially, to greater involvement of inhibitory control networks.

would expect to see a higher rate of article omissions in other structurally complex contexts. One obvious feature of a noun phrase that presents itself as a way to manipulate its complexity is nominal number (singular vs. plural). Here, the extra element is another functional morpheme rather than a lexical item. So, to further test the predictions of the L1-L2 structural competition model, the current study compared the rate of article omissions between definite singular NPs (Art + N) and definite plural NPs (Art + N + s). As the structure that overtly encodes two grammatical concepts, the definite plural is a more complex form than the definite singular, which grammatically marks only one concept, so a higher rate of article omissions could be expected as L2 users produce plural than singular targets.

Furthermore, as definite plurals are contexts that combine two functional morphemes, they provide an opportunity to test the broader applicability of the model by extending its prediction to the plural-marking morpheme *-s*. More specifically, if competition between L1- and L2-licensed forms explains variability in the production of L2 functional morphology more generally, one would expect a higher rate of plural omissions in (structurally more complex) definite plurals (Art + N + s) compared to non-definite plurals (N + s), for L2 users whose L1 does not obligatorily mark nominal number. These two predictions, ensuing from the model developed in Trenkic and Pongpairoj (2013) and Trenkic et al. (2014), were the focus of the current investigation.[2]

[2] Throughout the rest of this paper, unless otherwise specified, we use the term 'article' to refer only to the definite article. There is no need to specify the article type here since an article and a plural marking can only occur in the same NP if the article is definite (e.g., *the frogs* vs. **a frogs*).

Method

Participants

Twenty intermediate Thai learners of English (15 female, 5 male) participated in this study. Their English proficiency was determined using the Oxford Placement Test (OPT; Allan, 2004). In addition, six age-matched native English-speaking participants (5 female, 1 male) acted as controls. Because the experiment was based on certain assumptions about the production of articles and plurals by native speakers, the use of a control group enabled us to confirm that these assumptions were well-founded. The Thai participants were students at Chulalongkorn University, while the native English speakers were students at the University of York. The Thai participants' history of learning English and their achieved English proficiency are summarised in Table 1.

Table 1. *Summary of background characteristics for the Thai participants*.

	Range	Mean	SD
QPT scores	120-149	136.65	7.45
Age	18.15 – 22.51	19.72	1.24
Instructed English (years)	11.56-16.50	13.69	1.63
English immersion (years)	--	0	0

Materials

Twelve short stories were created, illustrated in examples (1) and (2), with the full set of materials provided in the appendix. Text (1) contains one definite-singular target (i.e., *the drum*), and one definite-plural target (i.e., *the trucks*); text (2) contains one definite-plural target (i.e. *the pans*), and one bare-plural target (i.e. *planes*).

(1) Jenny went to a toy shop to buy presents for her son. First of all, she purchased a drum which was made in Korea. A shop assistant wrapped it for her in colourful paper. Jenny bought ***the drum*** for her son because he likes music. After that, she bought four trucks for him to play with as well. She chose them because he loves playing with toy vehicles. Jenny put ***the trucks*** very carefully into a lovely bag. But her son didn't like anything that she had bought for him.

(2) Billy used to work as a dishwasher in a large restaurant. Late one evening, he washed six pans for his boss quite badly. After that, he dried them extremely carelessly as well. Then he dropped ***the pans*** very loudly and made a huge mess. His boss was really furious with him and fired him at once. So Billy had to find another way to make a living. Nowadays he sells ***planes*** from Russia and earns lots of money. He's glad he doesn't work as a dishwasher anymore.

All story texts were 81-90 words in length, each comprised of eight sentences. Each sentence contained 14-16 syllables. Twenty-four target NPs across three conditions – 8 bare plurals, 8 definite singulars and 8 definite plurals – were interspersed within the 12 stories (e.g., *the drum*, *the trucks, the pans* and *planes* in the above examples). The target NPs were neither pre- nor post-modified. Together, these 24 NPs provided contexts for the production of 8 definite articles in singular and 8 in plural contexts, as well as 8 plurals with definite and 8 plurals with non-definite NPs.

The target nouns referred to countable, concrete and easily imageable entities. They were all monosyllabic and orthographically short. Fifteen had a CVC syllable structure (e.g., *cat*), six were CCV(C) (e.g., *drum*, *tree*), and three had a (C)CVVC structure (e.g., *plate, lake*), equally distributed across the conditions. The above syllable structures are allowed by

Thai,[3] which reduced the likelihood of pronunciation problems with the target nouns. Special care was taken to ensure that none of the target nouns was an English loanword in Thai, as frequent use of a loanword without an article or plural marker in Thai might be expected to suppress the suppliance of functional morphology with such nouns in English. Low frequency words were avoided,[4] and all words were deemed likely to be familiar to the participants by a native speaker of Thai working on a daily basis with this population.

Each target NP was located post-verbally, ensuring consistency of position across conditions. The number of syllables preceding each target in the sentence in which it occurred was also controlled for. Thus, there were 2-7 syllables before each bare-plural target (M = 3.88, SD = 1.73), 2-6 syllables before each definite-plural target (M = 3.75, SD = 1.49) and 2-7 syllables before each definite-singular target (M = 3.75, SD = 1.67). A one-way ANOVA confirmed that there were no differences between the conditions, $F(2, 23) = .016$, $p > .05$, vis-à-vis the number of syllables which preceded the target. The number of bare (article-less) NPs was also balanced across texts to minimise the likelihood of a negative priming effect on article production in the targets. The mean number of article-less lexical NPs in the texts in which definite singular targets appeared was 5.00 (SD= 1.60), and in the texts containing definite plural targets 4.63 (SD = 1.85). There was no statistical difference between the two means, $t(14) = .43$; $p > .05$. Each story contained two target NPs, and they were distributed in a counterbalanced fashion. Table 2 shows the ordering of target NPs within and across the story texts.

---

[3] Although the templates shown here generated all of the target nouns used in the experiment, they do not generate all possible syllables in Thai (see Iwasaki & Ingkaphirom, 2005, for further information about syllable structure in this language).

[4]To determine word frequency, we used the list of frequencies per million words in the $SUBTLEX_{US}$ database (see http://expsy.ugent.be/subtlexus/). The values for the target nouns ranged from 3.55 (for *pots*) to 213.20 (for *gun*).

Table 2. *Counterbalancing of target NP types across texts.*

Story	First target NP	Second target NP
1-2	definite plural	bare plural
3-4	bare plural	definite plural
5-6	definite plural	definite singular
7-8	definite singular	definite plural
9-10	bare plural	definite singular
11-12	definite singular	bare plural

Each of the definite targets was the third mention of the referent in the text. Two slightly different approaches were employed depending on whether the target was singular or plural. For singular targets, the referent was introduced into the discourse via an indefinite NP (e.g., *a drum*). Then, in the following sentence, this referent was expressed as a pronoun (e.g., *it*). In the sentence after that, the referent was relexicalised as a noun within the target (e.g., *the drum*). For plural targets, a numeral plus plural noun was used and then a pronoun, before the referent was relexicalised as a noun (e.g., *four trucks … them … the trucks*). The second mention was added to each of these lexical chains for the sake of discourse naturalness; generally speaking, there is rarely a discourse-pragmatic motivation for relexicalising a referent as a noun on its second mention.

For plural targets, each item was situated immediately before a word beginning with either [f] or [v], as in *trucks very*. As Thai does not have words ending with two or more consonants, the absence of final consonant clusters in the L1 may inhibit learners' production of the plural *-s* in a word such as *trucks* ([tɹʌks]), resulting in plural omissions (cf. Lardiere, 2003, showing omission of tense inflection in L2 English). However, such a ban on final consonant clusters can be circumvented if the inflection occurs in an environment in which it can be resyllabified as the onset of the following syllable (Goad, White & Steele, 2003). For example, if *trucks* is followed by the preposition *in*, Thai learners of English may resyllabify these two words as [tɹʌk.sɪn], both of which fit the general template for a possible Thai word.

In a context in which resyllabification is possible, one might therefore expect an increase in inflectional suppliance rate compared to a context in which this process is not possible. But resyllabification of inflection is not *guaranteed* to occur in an environment in which it can occur theoretically; in fact, resyllabification may depend on non-linguistic factors, such as a speaker's fluency. In light of this uncertainty, it seemed preferable to simply block resyllabification in all contexts by ensuring that plural targets were consistently located in an environment in which inflectional *-s* could not be resyllabified.[5] For L1 Thai/L2 English learners, resyllabification can be blocked by locating each plural target before [f] or [v] (e.g., *trucks very* [tɪʌks.vɛɪɪ]), since the onset [sf] or [sv], respectively, is illicit or rare in both English and Thai.[6]

To minimise any effect of presentation order, two semi-randomised orderings of the 12 experimental stories were created (lists A and B). These two versions were given to equal numbers of participants in each group. Additionally, two warm-up texts were included, which were similar in length and structure to the experimental texts. They served to familiarise participants with the tasks.

Tasks

Two oral tasks were used to elicit the data: keyword-prompted story recall and elicited imitation (sentence repetition). Both tasks focused on spoken production only. In the story recall task, participants were asked to retell the story they had read and heard using written keywords as prompts. For the most part, only content words (in particular, nouns,

[5] Another way is to locate each of these targets directly before a pause. We did not use this strategy in the present experiment.

[6] In English, [sf] and [sv] onsets occur in words like *sphere* and *svelte,* respectively.

verbs and adjectives) from the text were used; however, a preposition, particle or personal pronoun was retained if its omission could cause confusion. Each line corresponded to one sentence in the story; the items in the line appeared in the order in which they occurred in that sentence. All of the nouns or verbs in the stories were used in their bare forms. This approach seemed appropriate given that we were interested in the production of functional morphology in obligatory contexts. These design features are exemplified in (3) using keywords which correspond to the sample text in (1).

(3) • Jenny / go / toy shop / to buy / present / her son
• first of all / she / purchase / drum / which / made / Korea
• shop assistant / wrap / it / for / her / colourful paper
• Jenny / buy / drum / for / her son / because / he / like / music
• after that / she / buy / four / truck / for / him / to play / with / as well
• she / choose / them / because / he / love / playing / toy vehicle
• Jenny / put / truck / very carefully / lovely bag
• but / her son / do / not / like / anything / that / she / buy / for / him

In the elicited imitation task, participants were played all sentences from the story, one sentence at a time, and were asked to repeat each sentence back. The sentence length of 14-16 syllables was intended to prevent participants from being able to merely "echo" the sentence without parsing it structurally (Gass & Mackey, 2005), and to push them instead to regenerate the sentence using normal sentence production mechanisms (Potter & Lombardi, 1998). The two tasks were used for triangulation purposes: when the same effect is found in more than one task, one can be more confident in the results. Using more than one task also reduced the possibility that a real effect may be missed, since not every task is equally good for detecting fine differences in L2 processing.

Procedure

Thai learners of English were screened for proficiency on the basis of their OPT performance. Only those scoring in the lower- (120-134) or upper-intermediate (135-149) ranges were selected for the study. The story-texts were presented through a PowerPoint slideshow on a computer that the participants controlled. The audio input was presented via headphones, apart from a warm-up story, when it was presented via loudspeakers so that the experimenter could check that each participant had understood the instructions correctly. The participants' spoken production was recorded using the freeware application Audacity and a high-quality microphone. The participants read the instructions and had a practice run using a warm-up story. They were instructed to read each story text once, after which they heard the same text while reading along silently again. After being familiarised with the story in this way, the participants were presented with the keywords and instructed to use them to retell the story orally (story recall task). The keywords had to be used in the order in which they appeared. The participants were asked to imagine that they were telling the story to someone who had never heard it before. Finally, each sentence from the story was played individually, and the participants were asked to repeat it back (elicited imitation task).

For the Thai participants, all written instructions for the task procedure were presented in Thai. Additionally, even though the stories were constructed using vocabulary which was deemed likely to be familiar to this population, the target nouns (two for each story), along with 5-7 others, were presented with Thai translations before each story. For example, for the text shown in (1), the vocabulary list contained *vehicle*, *loud*, *drum*, *truck* and *Korea*. The entries in each list were semi-randomly reordered with respect to their actual locations in the text. The participants were given one minute to read the entries, listen to them, and repeat them twice.

All participants were tested in two sessions. In both sessions, they heard a warm-up story and six experimental texts. To reduce the risk of fatigue, three short breaks were incorporated into each session after experimental stories one, three and five. Each session was completed in about 35-40 minutes by the Thai participants and in about 30-35 minutes by the native English speakers. In session one, the participants also completed a language background questionnaire; at the end of session two, the Thai participants were invited to comment on whether they found any part of the task particularly easy or difficult, or provide any other feedback. All the participants were tested individually in a quiet room. They were paid for their participation.

Scoring and analysis

The data was transcribed and statistically analysed. Two aspects of the transcription procedure must be mentioned briefly. Whenever a participant self-corrected an utterance, only the self-corrected version of the utterance was retained; and mispronunciations of the targets were disregarded if it seemed unlikely that these errors could have had a significant impact on how the target nouns were inflected (e.g., *plans* for *pans*).

For the purpose of calculating omission rates, we focused only on the opposition between "functional morpheme supplied" with target referents and "functional morpheme omitted". In the bare plural and definite singular conditions, each of which requires only one functional morpheme, participants could either produce or omit the required morpheme (i.e., two different NP patterns). With definite plurals, where two functional morphemes are needed, participants could either supply both morphemes, omit both, or supply one or the other, but not both (i.e., four different NP patterns). We were interested in comparing how often the participants omitted *the* in reference to conceptually singular targets with how often they omitted it in reference to plural targets. In the latter case, we were looking for article

omissions, irrespective of whether the plural was actually marked (i.e., combining *Ns* and *N* patterns in reference to plural targets). Similarly, we compared the omission rates of the plural morpheme *-s* with indefinite (bare) plurals and with definite plurals, irrespective of whether the article was supplied with definite plurals (i.e., combining *the N* and *N* patterns in reference to plural targets). Trials which resulted in errors other than omission (e.g., substitution errors, such as *a lake* for *the lake*) or where an appropriate but non-target structure was produced (e.g., *her gun* for *the gun*) were excluded from the analysis, as our predictions did not concern determiner substitution cases. This resulted in the exclusion of 10.16% of trials in the elicited imitation task and of 6.41% of trials in the story-recall task for the Thai group.

Predictions

We expected that Thai learners of English would supply functional morphology less consistently in structurally more than structurally less complex contexts. Specifically, our predictions were:

(1) articles will be omitted at a higher rate in definite-plural target NPs than in definite-singular target NPs; and
(2) plurals will be omitted at a higher rate in definite-plural target NPs than in bare-plural target NPs.

These patterns were expected in both tasks, irrespective of the overall suppliance rates for articles and plurals.[7]

[7] Comparing the overall suppliance of articles and plural morphology was not the focus of our research. However, one might expect somewhat better suppliance of *the*, compared to the plural *–s*, based on prior

Results

Native speakers of English

The native speakers supplied all articles and plurals accurately in all conditions. This suggests that any article and plural omissions in the speech of the Thai participants were highly unlikely to reflect any particular properties of the tasks themselves and could be safely attributed to L2-specific factors instead. Because the native speaker data in this experiment only served to control for possible task effects, these data will not be discussed any further.

Thai learners of English

Table 3 summarises the percentage of trials in which the Thai participants omitted the definite article and plural-*s* in reference to targets in the elicited imitation and the story-recall tasks.

Table 3. *Mean values* of *omission errors (standard deviations in parentheses) in the story-recall and elicited imitation tasks*

Target	Story recall	Elicited imitation
the-omission in Definite Singular *(the N)*	36.64 (28.20)	5.48 (10.13)
the-omission in Definite Plural *(the Ns)*	51.79 (31.95)	5.14 (7.35)
-s omission in indefinite (bare) plural *(Ns)*	41.25 (29.55)	39.55 (24.98)
-s omission in Definite Plural *(the Ns)*	39.61 (28.96)	54.25 (26.15)

evidence that production of high-frequency grammatical structures is less adversely affected by competition in bilingual processing than production of low frequency structures (Runqvist, Gollan, Costa & Ferreira, 2013) and given that the definite article is the most common word in English.

Figure 1 illustrates article omissions in definite singular versus definite plural contexts in the two tasks. Performance in the elicited imitation task appeared to be at ceiling for both singular and plural targets, with a very low omission rate (5.14% and 5.48%, respectively). However, performance in the story-recall task was more variable, and in line with our first prediction: Thai learners of English were omitting definite articles more often with plural (51.79%) than with singular targets (36.64%).

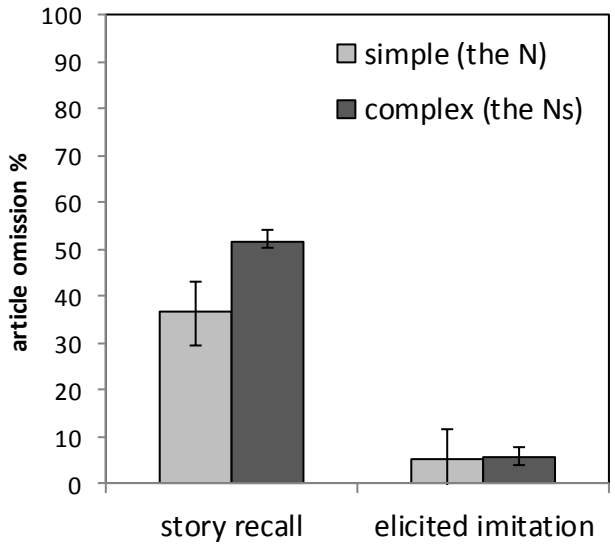

Figure 1. Thai learners' of English article omission in simpler (i.e., singular NP) and more complex (i.e., plural NP) contexts in the story-recall and the elicited imitation tasks. The error bars represent standard error (SE).

Figure 2 summarises the results for plural omission by Thai learners of English in the two tasks. Unlike article production, plural suppliance appeared well below ceiling levels in both the story-recall and the elicited imitation tasks, with omissions of at least 40% in all conditions. No discernible difference between plural omissions in definite and indefinite contexts was observed in the story-recall task (39.55% and 41.25%, respectively). However,

in line with our second prediction, the plural morpheme was omitted at a higher rate in definite (54.25%) than indefinite contexts (39.61%) in the elicited imitation task.

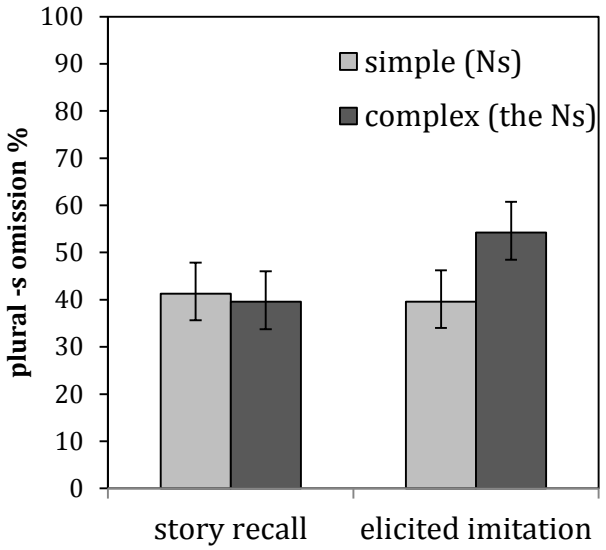

Figure 2. Thai learners' of English plural *-s* omission in simpler (indefinite, i.e., bare NP) and more complex (definite NP) contexts in the story-recall and the elicited imitation tasks. The error bars represent standard error (SE).

For the purpose of data analysis, we ran a series of mixed-effect logistic regression models, using the lme4 package in R version 2.11.0. [8] The random effect structure included two random effect factors, participant and item, with random intercepts. Contrast coding was used for the fixed effects, with grammatical morpheme production rates ("supplied" and "omitted") as the outcome variable. The model included a predictor variable, which was the structural complexity of the context in which the grammatical morpheme should appear ("less

[8] Mixed-effects logistic regression techniques are particularly suited to use with outcome variables that are binary, such as in the current study, and to use with both categorical and continuous predictor variables (see Baayen, 2008; Baayen, Davison & Bates, 2008; Bresnan, Cueni, Nikitina & Baayen, 2007; Jaeger, 2008; Narasimhan & Dimroth, 2008). The same results were obtained in a repeated-measure ANOVA.

complex" vs. "more complex"). As items were presented to participants in two different semi-randomised orders (lists A and B), list was also entered as a control variable.[9]

Table 4. *Coefficients for a logistic mixed-effects regression model fitted to the article omission data in the story-recall task (Thai learners of English).*

Random effects	**Variance**	**Std. Dev.**		
Participants (intercept)	2.50	1.58		
Items (intercept)	0.47	0.68		
Fixed effects	**Estimate**	**Std. Error**	**Z**	***p***
(Intercept)	0.21	0.61	0.34	0.73
Complexity: simple	-0.98	0.30	-3.23	0.00 **
List: B	-0.30	0.77	-0.40	0.69

Note. Reference levels are complex for Complexity and list A for List.

Table 4 summarises the results of the analysis for the article data from the story-recall task, with model coefficients reported under the heading "Estimate". The values of standard errors provide an indication of how confident one can be of the estimate of the coefficient: the smaller the error, the smaller the chance that the estimate could just be zero (and hence a worthless predictor). The *Z*-value was calculated by dividing the coefficient value by its standard error; with the polarity of the value (positive/negative) indicating the direction of the effect. If the *p*-value is significant, this means that the coefficient is significantly different from zero (and therefore is a useful predictor for the dependent variable). As the critical

[9] Following the advice of an anonymous reviewer, we carried out additional analyses with the following factors used as control variables: number of article-less NPs in the texts; order of item presentation; ratios of bare plurals vs. definite plurals, and of definite singulars to definite plurals in the British National Corpus for each target. None of these variables reached significance, and were removed from model specifications.

experimental variable was structural complexity in this analysis, the model compared the omission of articles in simple (*the NP*) versus complex (*the NPs*) contexts. The omission of the article in structurally simpler contexts was significantly lower than in structurally more complex ones, $\beta = -.98$, $Z = -3.23$, $p < 0.01$. However, this was only the case in the story-recall task. As can be seen in Table 5, there was no effect of complexity on article production in the elicited imitation task, $\beta = .006$, $Z = .01$, $p > .05$. The list factor (i.e., two different orders of item presentation) was not a significant predictor in either task.

Table 5. *Coefficients for a logistic mixed-effects regression model fitted to the article omission data in the elicited-imitation task (Thai learners of English).*

Random effects	**Variance**	**Std. Dev.**		
Participants (intercept)	0.57	0.76		
Items (intercept)	0.23	0.48		
Fixed effects	**Estimate**	**Std. Error**	**Z**	***p***
(Intercept)	-3.41	0.63	-5.4	0.00 ***
Complexity: simple	0.01	0.62	0.01	0.99
List: B	0.23	0.72	0.32	0.75

Note. Reference levels are complex for Complexity and list A for List.

Tables 6 and 7 show the results of the analysis for the plural *-s* data from the two tasks. As before, the critical experimental variable was structural complexity and the model compared omissions of plural *-s* in simple (i.e., indefinite, bare plurals, or *NPs*) versus complex (i.e., definite plurals, or *the NPs*) contexts. This time, the effect of structural complexity was significant only in the elicited imitation task, as shown in Table 7, with the omission of plural *-s* in structurally more complex contexts being significantly higher than in

structurally simple ones, β = -.65, Z = -2.70, p < .01. A similar effect was not observed in the story-recall task, as shown in Table 6, β = .09, Z = .34, p > .05. As with articles, the list factor was not a significant predictor for plural *–s* production, in either the story-recall or the elicited imitation task.

Table 6. *Coefficients of a logistic mixed-effects regression model fitted to the plural* -s *omission data in the story-recall task (Thai learners of English).*

Random effects	**Variance**	**Std. Dev.**		
Participants (intercept)	1.49	1.22		
Items (intercept)	0.00	0.00		
Fixed effects	**Estimate**	**Std. Error**	**Z**	***p***
(Intercept)	-0.71	0.44	-1.60	0.11
Complexity: simple	0.09	0.25	0.34	0.73
List: B	0.42	0.61	0.70	0.49

Note. Reference levels are complex for Complexity and list A for List.

Table 7. *Coefficients for a logistic mixed-effects regression model fitted to the plural* -s *omission data in the elicited-imitation task (Thai learners of English).*

Random effects	**Variance**	**Std. Dev.**		
Participants (intercept)	0.64	0.80		
Items (intercept)	0.00	0.00		
Fixed effects	**Estimate**	**Std. Error**	**Z**	***p***
(Intercept)	-0.08	0.33	0.24	0.81
Complexity: simple	-0.66	0.24	-2.70	0.01 **
List: B	0.20	0.43	0.46	0.64

Note. Reference levels are complex for Complexity and list A for List.

Discussion

The aim of the present study was to contribute to the debate concerning factors that make learning and using L2 grammar difficult. Specifically, the study set out to test a prediction arising from the L1-L2 structural competition model (Trenkic & Pongpairoj, 2013; Trenkic et al., 2014). This model predicts that if L1- and L2-licensed structures compete for selection in L2 production, thus putting a premium on cognitive resources, it will be more difficult for L2 users to suppress inappropriate L1 options in cognitively more than less demanding contexts. Our focus was on two functional morphemes of the English nominal phrase with which learners often struggle: the definite article and plural marking *–s*. Cognitive demand was operationalised as the complexity of the immediate linguistic context in which a functional element should be used, specifically as the number of functional meanings expected to be overtly encoded within a phrase. We employed a story-recall task and an elicited imitation task to explore whether Thai learners of L2 English, whose L1 does not obligatorily mark either number or definiteness, omit the definite article more often with plural than singular NPs (Prediction 1), and whether they omit the plural *-s* more often with definite than indefinite (bare) NPs (Prediction 2).

Both predictions received support from the data. In the story-recall task, articles were supplied better in the simpler context in which only definiteness, but not number, needed to be overtly encoded, compared to the more complex context, which called for the explicit encoding of both definiteness and number. Similarly, in the elicited imitation task, plurals were more consistently used in the context in which grammatical number but not definiteness needed to be overtly marked, compared to the context in which both needed to be marked (see below for discussion of task differences).

These results lend support to the L1-L2 structural competition model, which assumes that L2 learners acquire new L2-licensed patterns for encoding a particular meaning but that these patterns compete with existing L1 patterns, contributing to variability in L2 production. When an extra element of meaning needs to be encoded within a single phrase, making the phrase more complex and thus more resource-demanding, fewer resources are left available for the task of inhibiting the L1 structural alternatives, and the probability that these (non-target) alternatives will be selected increases, compared to simpler contexts without this extra element. The model was originally developed to account for higher rates of article omissions with adjectivally modified (Art + Adj + N) than non-modified (Art + N) NPs in the production of L2 speakers whose L1s do not obligatorily mark definiteness.[10] The current data show that this model also accurately predicts a higher rate of article omissions with definite plurals (Art + N + s), compared to definite singulars (Art + N), where the complexity is increased by the presence of another functional morpheme. This is also the first demonstration that the coverage of the model extends beyond L2 article production, with the model correctly predicting a higher rate of plural omission with more complex definite (Art + N + s) than less complex indefinite (N + s) NPs when the L1 does not overtly mark plurality. Overall, our results support accounts which propose that activation of grammatical structures in bilingual production is not language-selective (Hartsuiker et al., 2004; Hartsuiker & Pickering, 2008; Runkqvist et al., 2013).

[10] This model was also used to explain a higher rate of article omissions with more than less salient referents in the production of Thai learners of English. Trenkic and Pongpairoj (2013) argue that salient referents take up more representational space in memory compared to less salient referents, leaving fewer resources to suppress the article-lacking L1 options.

Alternative explanations

While these results are in line with the idea that competition between L1- and L2-licensed grammatical patterns contributes to variability in the production of L2 functional morphology, with L1-licensed patterns selected more often in more than in less cognitively-demanding contexts, there could be alternative explanations. One important point to consider is whether the patterns of behaviour we have observed could be explained without assuming L1-L2 competition. Definite singular constructions in English are overall more frequent in the input than definite plurals (Ramscar, Dye & McCauley, 2013), and the frequency with which the definite article is encountered with different constructions may result in it being supplied more accurately with singular than with plural nouns. Similarly, bare plurals are overall more frequent than definite plurals, and this asymmetry may lead to a more accurate use of bare plurals. Furthermore, omitting the article with a definite plural NP (*the chairs*) results in a bare plural (*chairs*), and omitting the plural marker results in a definite singular (*the chair*), both of which are grammatically well-formed structures. However, omitting the article with a definite singular (*the chair*) or omitting the plural marker in a bare plural (*chairs*) gives rise to a bare nominal (*chair*), which is grammatically unacceptable in English, at least in reference to countable concepts.[11] It is therefore conceivable that the asymmetries in article and plural suppliance reveal the participants' underlying sensitivity to the

[11] One situation in which bare-singular countable nouns can be used appropriately is when they are re-classified as mass (e.g., when talking about the meat of an animal, as in *I like duck, especially in a spicy curry*). Such reclassifications are relatively infrequent, however, and when they do occur, the reference is to a mass, not a countable concept. Note, though, that while bare nominals are rarely encountered in reference to singular countable concepts, they are far from rare in English: Master (1993, cited in Lu, 2001, p. 44) reports that nearly half of all nominals in English appear without an article (48%), slightly more than a third with the definite article (36.3%) and less than one sixth with an indefinite article (15.7%).

grammatical options and structural regularities of English. In other words, the competition that leads to variability may be coming solely from the L2 itself.

The computation of co-occurrence relations and transitional probabilities between elements has been shown to be one of the central mechanisms in L1 learning (e.g., Lew-Williams & Fernald, 2007; Saffran, Aslin & Newport, 1996), and it seems only reasonable to assume that it remains available in adult L2 learning, too. L2 learners, through the input they receive, must gradually develop an implicit understanding for what is and what is not a legitimate L2 grammatical pattern; this emerging sensitivity may partly be reflected in our data.[12] But can the L2-internal competition alone account for the obtained findings? We think that it is unlikely for reasons explained below, but the idea can be empirically tested in future research: if the emerging sensitivity to structural regularities in the L2 were the *sole* reason for asymmetric patterns in functional morphology production, we would expect to see the same patterns across L2 populations, irrespective of the grammatical structures that their L1s utilise. In that case, one would expect to see that French learners of English, who mark both number and definiteness in their L1, omit articles and *–s* at the same rate as the Thai learners in our study did, furthermore omitting *the* more often with plurals than singular NPs and omitting *–s* more with definite than indefinite plurals. If they did, this would lend support to the L2-internal-competition-only view and would argue against the involvement of L1-L2 competition, which would predict differences between these two populations. While our data

[12] Trenkic (2009) observes that implicit statistical learning may also in part be responsible for previously-observed higher levels of article omissions with adjectivally modified (*the sleepy cat*) than non-modified NPs (*the cat*). While neither *sleepy cat* nor *cat* are legitimate referential forms in English, there is a stronger co-occurrence relation between an article and a count noun (*the cat*) than an article and an adjective (*the sleepy*), as adjectives can modify mass and plural nouns without an associated determiner (Trenkic, 2009). An implicit statistical sensitivity to such grammatical contingencies in the input may lead to more frequent article omissions in L2 production with adjectivally modified than non-modified NPs.

from a single L2 population cannot speak to this possibility, previous research argues strongly against it. Not only is it well documented that L2 populations whose L1s do not mark definiteness and nominal number struggle clearly more with English articles and plural *–s* than L2 populations whose L1s mark these functional meanings, but some evidence already exists that an increased cognitive demand created by context complexity negatively affects the suppliance of functional morphology with the former L2 populations but not the latter. For example, Pongpairoj (2008) shows that intermediate and advanced Thai learners of English, but not proficiency-matched French learners, show a statistically significant asymmetry in article suppliance with adjectivally modified (*the fat cat*) versus non-modified NPs (*the cat*).

In sum, we maintain that unless competition arising from L1 grammatical patterns is assumed, it is difficult to account for the regularly-observed higher rates of functional-morphology omission in L2 populations whose L1s do not obligatorily mark a particular grammatical concept compared to populations whose L1s do, and for the less pronounced or non-existent asymmetries in functional-morphology production by the latter L2 populations (Austin, 2014; Díez-Bedmar & Papp, 2008; Jarvis, 2002; Luk & Shirai, 2009; Pongpairoj, 2008; Pongpairoj & Trenkic, 2013; Sarko, 2009; Snape, 2006). Furthermore, an explanation based on sensitivity to the grammatical options and structural regularities in the L2 leaves many attested asymmetric patterns unaccounted for. For example, Thai learners of English also omit articles more often with more, compared to less salient referents in discourse (e.g., showing greater article omission with the subject than the object in sentences such as *The red fish has eaten the blue fish*), while proficiency-matched French learners of English do not exhibit this pattern (Trenkic & Pongpairoj, 2013).

The question remains, however, what contribution, if any, the emerging sensitivity to L2 structural regularities makes in L2 functional morphology production, and whether it

interacts with L1-L2 structural competition. Although we cannot answer this question based on the current data, we outline a novel proposal for how the L1-L2 structural competition model and the sensitivity-to-L2-structural-regularities account could be integrated and their respective contributions studied under a constraint-satisfaction approach to language processing. But first, we consider the limitations of the present research arising from task differences.

Limitations: Task differences

The results of the present study support our hypotheses that *the* and *-s* would be omitted more often in more complex *the Ns* contexts than in simpler *the N* and *Ns* structures. However, context complexity had the predicted effect on article omissions in the story-recall but not in the elicited imitation task; in contrast, for the plural, the effect was only present in the elicited imitation but not the story-recall task. This was an unexpected finding. Task effects on functional morphology production were not the focus of our research, and our study was not designed to account for task differences.

The results from the story-recall task lend themselves to at least two interpretations: (a) context complexity has the predicted effect on L2 article production, confirming the findings from previous research, but it does not extend to L2 plural *–s* production; or (b) a story-recall task is not a sensitive instrument for detecting this effect in the production of functional morphemes such as plural *–s*. The results from the elicited imitation task, which show the effect of context complexity on plural production, favour this second interpretation. Because the notion of plurality ("more than one") is relatively easy to conceptualise, compared to the notion of definiteness, and because there was more time for utterance planning in the story-recall task than in the elicited imitation task, it is plausible that story

recall may not have been sufficiently difficult, as far as the plural *–s* production is concerned, for the context complexity effect to be detected.

The elicited imitation task, however, yielded another unexpected finding in that the participants supplied the article at ceiling levels in this task. This was surprising given that their mastery of this functional morpheme was far from perfect, as demonstrated by their much weaker performance in the story-recall task. One methodological concern regarding the elicited imitation task is that participants may in some cases rely on rote repetition rather than on reconstructive imitation (Erlam, 2006; Hsieh & Lee, 2014; Mackey & Gass, 2005; Vinther, 2002), and this may have been the issue with articles here. Whether a participant can rely on rote memory depends on a number of factors (see Hsieh & Lee, 2014, for an overview), one of which can be the perceptual salience of the element in question. While functional morphemes in general have low salience compared to content words, English articles are perceptually more salient than the plural *–s* in terms of number of phones, syllabic structure and sonority (Goldschneider & DeKeyser, 2001), in addition to being independent rather than bound morphemes, and preceding the noun with which they are associated, rather than following it. All this may help articles to be better preserved in memory, allowing L2 users to reproduce them at ceiling levels through rote repetition and minimizing any potential effect of context complexity. Thus, the elicited imitation task may not be a good choice for studying more salient functional morphemes such as articles, but perfectly adequate for less salient morphemes like plural *–s*, which are less likely to be reproduced by rote memory.

This is a testable hypothesis which future research on the interaction between task characteristics and functional morpheme properties may explore. For example, it would be interesting to investigate whether other functional morpheme that are difficult to perceive due to low perceptual salience but that stand for concepts that are relatively easy to conceive of, such as past tense marker *–ed*, would show similar behaviour to the plural marking *–s*,

showing the effect of context complexity through elicited imitation but not story recall. Would another functional morpheme that is relatively perceptually salient but that represents a conceptually less transparent property, such as aspect marking in *have/has*, behave like articles, showing the effect of structural complexity in the story-recall but not in the elicited imitation task? And would the effect be present in both tasks for functional morphemes that are both perceptually non-salient and which may be difficult to conceptualise, such as third-person singular *–s*? In sum, while task differences were not expected, the outcome is nevertheless intriguing. It calls for further research to test the robustness of the obtained effect, and to understand the interplay between task characteristics and functional morpheme production.

We note here that the choice of keyword prompted story-recall and elicited imitation tasks used in this study were motivated by the experimental need to control strictly for a number of important variables, including lexical form of a target noun (e.g., *planes* rather than *airplanes*), words directly following a target noun to avoid resyllabification of plural *–s* as the onset of another syllable, sentence position of a target noun, number of syllables that precede it (see Methods). A less constrained production task would not have allowed for these experimental controls. A possible direction for future research would be to triangulate the findings from a prompt-based story-recall task, as used here, with those from a less constrained picture-based story-retelling task, which would be a more authentic speaking task. Furthermore, different tasks can be used in future research to address some of the methodological issues identified above. For example, a variant of elicited imitation known as syntactic priming comprehension and production (SPCP, see Hsieh & Lee, 2014) has the potential to dramatically reduce the likelihood of rote repetition. In this task, participants first match an aural stimulus with a picture (comprehension), which later serves as a prompt for reconstructive imitation (production). Crucially, the stimuli are presented in blocks, so that

two or three comprehension trials may precede the elicited imitation block. This task appears well suited to studying both more and less salient functional morpheme production; additionally, the procedure makes it possible to control for whether the stimulus was correctly processed in comprehension, so that problems of production and comprehension can be teased apart.

Future directions: Towards a constraint-satisfaction approach to L2 variability

So what impact might an emerging sensitivity to statistical regularities in the L2 input have on L2 functional morphology production, and how might it interact with L1-L2 structural competition? We propose that important insights into L2 production mechanisms can be gained in future research by considering constraint-satisfaction theories, originally developed in the context of work on L1 language processing, including research on L1 comprehension (MacDonald, Pearlmutter & Seidenberg, 1994; see also research carried out within the Competition Model, e.g., Bates & MacWhinney, 1989), and L1 production research (Haskell & MacDonald, 2003; see also Bock & Levelt, 1994). In the constraint-satisfaction framework, the result of processing is determined by the interaction of multiple probabilistic cues that activate, in parallel, information from a variety of sources: grammar, meaning, discourse, world-knowledge and so on (Elman, Hare & McRae, 2004). Cues compete to constrain the outcome of processing; they interact with each other and contribute towards promoting or inhibiting particular alternatives, to arrive at a preferred analysis or structure.

Most of the time, different cues and information sources converge to promote the same outcome. For example, both the grammar of a singular noun like *ship*, and its conceptual characteristics (denoting a singular entity) converge to promote the use of a singular verb (e.g., *The ship is sailing west*). But when different cues promote competing

alternatives, for example, the grammar of the singular noun *fleet* promoting the use of a singular verb but its conceptual characteristics promoting the use of a plural verb, this leads to variability in responses (e.g., *The fleet is/are sailing west*) and longer processing times (Bock, Nicol & Cutting, 1999; Haskell & MacDonald, 2003). Language processing and language acquisition are tightly linked in this framework: learning involves accumulation of information about statistical and probabilistic aspects of language across many thousands of constructions. On the basis of exposure to examples in the input, learners acquire statistical information about the behaviour of lexical items, and abstract regularities across them (Seidenberg & McDonald, 1999).

A strength of this approach is that it provides a natural framework for explaining how highly disparate factors interact during processing. As such, it seems particularly suited to analysing bilingual processing as it allows, in principle, for both language-internal and cross-linguistic competition. In L2 production, the speaker knows two languages, which represent two sources of information on how a concept or an event could be structurally encoded. Both will receive a partial activation, will interact with each other and will promote or inhibit certain alternatives. For example, if an object is encoded by a singular noun in the L2 (e.g., *door* in English) but by a *plurale tantum* noun in the L1 (e.g., *vrata* = "door-pl" in Serbian), the model predicts that the L1 will promote the use of the plural form of the verb while the L2 will promote the singular form, contributing to variability in responses (e.g., *The door is/are closed.*). A constraint-satisfaction model of L2 production would explicitly assume that the contribution of a given source of information (e.g., an L1 or L2 grammar) will be modulated by other constraints such as frequency and discourse contexts. For example, a context in which the L2 is normally spoken will act as an inhibitor of L1 lexical and structural alternatives while promoting those from the L2. At the same time, however, the frequency with which a lexical or grammatical structure has been used by an individual in the

past to encode similar events may counteract to boost the activation of a more entrenched L1 option over L2 options. The relative strengths of all constraints would lead to graded effects in production (i.e., varying degrees of preference for particular alternatives). As the relative strengths of constraints change (e.g., through amassing L2 input), so too does L2 behaviour.

Because a constraint-satisfaction model allows for both language-internal and cross-linguistic competition to operate simultaneously, it offers a suitable framework for extending the present line of research. For example, future research could investigate the effect of lexical frequency on suppliance of specific functional morphemes (such as the marking of number and definiteness on nouns). If learning proceeds by acquiring item-based regularities first, then we would expect to see a more accurate use of functional morphology with high- than low-frequency items (i.e., items about whose behaviour the learner has acquired more statistical information through input and exposure). Another interesting question that could be profitably explored within the constraint-satisfaction model is the effect that the frequency with which individual lexical items occur as definite singular, definite plural or indefinite plural has on article/plural production. For example, an L2 user may be less likely to supply definite articles with plural forms of certain lexical items, if they are almost exclusively encountered as bare plurals (i.e., where the ratio of definite vs. bare plural is particularly low).[13]

Furthermore, it would be revealing to look at nouns whose distributional properties buck the general trend. For example, most count nouns are more frequently encountered as definite singular than definite plural, and it is difficult to tease apart the influence of L1-L2

[13] We didn't control for this when selecting our experimental items, but post-hoc analyses based on the British National Corpus (BNC) searches suggest that there was no statistical difference in the bare versus definite plural ratio between the three conditions, nor between the definite singular versus definite plural ratio.

competition from a possible effect of L2 structural regularities (as discussed previously). However, there are some reasonably high-frequency items which are encountered more often as definite plural (e.g., *the neighbours*) than as definite singular (e.g., *the neighbour*). If L2 learners are developing sensitivity to such statistical and probabilistic aspects of the target input, we would expect to see an interaction with L1-L2 structural competition. Thus, in the case of nouns which are more frequently encountered as definite singular than definite plural (e.g., *the cat*/*the cats*), we would expect to see a higher level of article suppliance in the singular than in the plural, both on account of the characteristics of the input (e.g., *the cat* is more frequent than *the cats*) and L1-L2 structural competition (i.e., cognitive resources are more depleted and so the L1 option(s) more difficult to suppress in plural than singular contexts). In contrast, we would expect to see this asymmetry attenuated, or disappear, in nouns such as *neighbour*, which are more frequently encountered as definite plural than definite singular; in this case, the two constraints would operate in the opposite directions, cancelling each other out.

Finally, the constraint-satisfaction model of L2 production would predict that some L2-internal competition may be detectable in most L2 populations (at least in early stages of learning, or under time pressure), but that its interaction with L1-L2 competition would lead to some production patterns being far more pronounced in populations that do not mark particular functional meanings in their L1s. One of the important assumptions of constraint-satisfaction models is that the interactions between constraints are non-linear (Seidenberg & McDonald, 1999). This means that a type of information that is not very constraining in isolation (e.g., options that are grammatically available, but not contextually appropriate in the L2, such as *dogs* in reference to a group of uniquely identifiable dogs) may become highly influential when considered with another one (e.g., options that are grammatically valid in the L1, such as the use of a bare noun to refer to a definite-plural entity).

In sum, there seems to be wide scope for further research that can be conducted within constraint-satisfaction approaches to L2 production in order to investigate which sources of information get activated in bilingual processing, and how they interact and contribute to promoting and inhibiting particular alternatives. Another extension of the present research might involve focusing on other, especially morphologically richer languages than English as L2s. For example, L1 acquisition studies reported in Laaha and Gillis (2007) suggest that children acquire functional morphology easier and earlier, the more functional morphology is present in a language. It would, therefore, be interesting to compare functional morphology production in L2 English with morphologically richer L2s, where additional options may need to be considered in production, looking at the frequency and consistency of the input available to learners for a specific piece of morphology (i.e., "cue validity" in the Competition Model of Bates and MacWhinney, 1989) as another important constraint in processing.

Conclusion

The results of this study support the view that grammatical patterns from the L1 get partially activated in L2 production, competing with newly-learned L2 patterns for selection, and leading to variability in L2 behaviour. The structural-competition model developed originally to account for patterns of L2 article production (Trenkic, 2007, 2009; Trenkic & Pongpairoj, 2013; Trenkic et al., 2013) has been shown to have broader applicability, predicting not only new patterns in the production of L2 English articles but also of the plural *-s*. However, the predicted effect was detected for the definite article through story recall but not elicited imitation, and for the plural through elicited imitation but not story recall, calling

for further research to test the robustness of this effect and to explore further the interaction between task characteristics and functional morphology production.

The current findings are also suggestive of the possibility that patterns of L2 functional morphology production may reflect L2 learners' developing implicit sensitivity to what does and does not constitute a legitimate and contextually appropriate grammatical pattern in the L2. In sum, not only did the idea of structural competition between L1 and L2 patterns receive corroboration, but the results also suggest that other forms of competition, notably between different L2 patterns, could come into play in the production of functional morphology. Assuming that multiple probabilistic cues interact in L2 processing, we suggest that the constraint-satisfaction approach, originally developed to account for monolingual language processing, could be an appropriate framework in which to study and explain bilingual processing.

References

Allan, D. (2004). *Oxford Placement Test*. Oxford: Oxford University Press.

Austin, G. (2014). *Asymmetries in L2 functional morphology: The Korean learner of English*. (PhD dissertation, University of New England (Australia)).

Avery, P. & Radišić, M. (2007). Accounting for variability in the acquisition of English articles: In A. Belikova, L. Meroni, & M. Umeda (Eds.) *Proceedings of the 2nd conference on Generative Approaches to Language Acquisition, North America (GALANA)*, pp. 1-11. Somerville, MA: Cascadilla Proceedings Press.

Baayen, R.H. (2008). *Analyzing linguistic data: A practical introduction to statistics using R*. Cambridge: Cambridge University Press.

Baayen, R.H., Davidson, D.J., & Bates, D.M. (2008). Mixed-effects modelling with crossed random effects for subjects and items. *Journal of Memory and Language, 59* (4), 390-412.

Bates, E., & MacWhinney, B. (1989). Functionalism and the Competition Model. In B. MacWhinney & E. Bates (Eds.), *The cross-linguistic study of sentence processing* (pp. 3–73). Cambridge: Cambridge University Press.

Bedny, M., Hulbert, J.C., Thompson-Schill, S.L. (2006). Understanding words in context: The role of Broca's area in word comprehension. *Brain Research, 1146*, 101–114.

Bialystok, E., & Miller, B. (1999). The problem of age in second-language acquisition: Influences from language, structure, and task. *Bilingualism: Language and Cognition, 2* (2), 127–145.

Bliss, H. (2006). L2 acquisition of inflectional morphology: Phonological and morphological transfer effects. In M. G. O'Brien, C. Shea, & J. Archibald (Eds.), *Proceedings of the*

8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006), pp. 1–8. Somerville, MA: Cascadilla Proceedings Project.

Bock, K., & Levelt, W. J. M. (1994). Language production: Grammatical encoding. In M.A. Gernsbacher (ed.), *Handbook of Psycholinguistics*, pp. 945–984. London: Academic Press.

Bock, K., Nicol, J., & Cutting, J.C. (1999). The ties that bind: Creating number agreement in speech. *Journal of Memory and Language, 40* (3), 330-346.

Bresnan, J, Cueni, A., Nikitina, T., & Baayen, R.H. (2007). Predicting the dative alternation. In G. Bouma, I. Kraemer, & J. Zwarts (Eds.), *Cognitive foundations of interpretation* (pp. 69-94). Royal Netherlands Academy of Arts and Sciences.

Butler, Y. G. (2002). Second language learners' theories on the use of English articles: An analysis of the metalinguistic knowledge used by Japanese students in acquiring the English article system. *Studies in Second Language Acquisition*, *24* (3), 451–480.

Charters, H., Dao, L., & Jansen, L. (2011). Reassessing the applicability of processability theory: The case of nominal plural. *Second Language Research, 27* (4), 509–533.

Chrabaszcz, A., and Jiang, N. (2014). The role of the native language in the use of the English nongeneric definite article by L2 learners: A cross-linguistic comparison. *Second Language Research, 30* (3), 351–379.

Dao, L. (2007). *Foreign language acquisition: Processes and constraints.* (PhD dissertation, Australian National University).

DeKeyser, R.M. (2005). What makes learning second-language grammar difficult? A review of issues. *Language Learning, 55* (S1), 1–25.

Díez-Bedmar, M., & Papp, S. (2008). The use of the English article system by Chinese and Spanish learners. In G. Gilquin, S. Papp & M. Díez-Bedmar (Eds.), *Linking up contrastive and learner corpus research*, (pp. 147–176). Amsterdam: Rodopi.

Ellis, N.C. (2004). The processes of second language acquisition. In B. VanPatten, J. Williams, S. Rott, & M. Overstreet (Eds.), *Form-meaning connections in second language acquisition*, pp. 49–76. London: Lawrence Erlbaum Associates.

Elman, J. L., Hare, M., & McRae, K. (2004). Cues, constraints, and competition in sentence processing. In M. Tomasello and D. Slobin (Eds.) Beyond Nature-Nurture: Essays in Honor of Elizabeth Bates (pp. 111-138). Mahwah, NJ: Lawrence Erlbaum Associates.

Erlam, R. (2006). Elicited imitation as a measure of L2 implicit knowledge: An empirical validation study. *Applied Linguistics, 27*, 464-491.

García Mayo, M.P. (2009). Article choice in L2 English by Spanish speakers: evidence for full transfer. In R. Hawkins & M .P. García Mayo (Eds.), *Second language acquisition of articles: Empirical findings and theoretical implications* (pp. 13–36). Amsterdam: John Benjamins.

Gass, S. M., & Mackey, A. (2007). *Data elicitation for second and foreign language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Goad, H., & White, L. (2004). Ultimate attainment of L2 inflection: Effects of L1 prosodic structure. In S. Foster-Cohen, M. Sharwood Smith, A. Sorace, & M. Ota (Eds), *EUROSLA Yearbook 4* (pp. 119–145). Amsterdam: John Benjamins.

Goad, H., White, L., & Steele, J. (2003). Missing inflection in L2 acquisition: Defective syntax or L1-constrained prosodic representations? *Canadian Journal of Linguistics*, *48*, 243–263.

Goldschneider, J. M., & DeKeyser, R. M. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: A meta-analysis of multiple determinants. *Language Learning, 51*, 1–50.

Gollan, T. H., Montoya, R. I., Cera, C., & Sandoval, T. C. (2008). More use almost always means a smaller frequency effect: Aging, bilingualism, and the weaker links hypothesis. *Journal of Memory and Language, 58*, 787–814.

Hakuta, K. (1976). A case study of a Japanese child learning English as a second language. *Language Learning, 26*, 321-351.

Han, Z. (2009). Grammatical morpheme inadequacy as a function of linguistic relativity. A longitudinal case study. In Z. Han & T. Cadierno (eds.) *Linguistic relativity in second language acquisition*, pp.154–182. Clevedon: Multilingual Matters.

Hartsuiker, R.J., & Pickering, M. J. (2008). Language integration in bilingual sentence production. *Acta Psychologica, 128*, 479–489.

Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004). Is syntax separate or shared between languages? Cross-linguistic priming in Spanish-English. *Psychological Science, 15*, 409–414.

Haskell, T. R., & MacDonald, M. C. (2003). Conflicting cues and competition in subject–verb agreement. *Journal of Memory and Language, 48*, 760–778.

Hsieh, A.F-Y. & Lee, M-K. (2014). The evolution of elicited imitation: Syntactic priming comprehension and production task. *Applied Linguistics, 35*, 595-600.

Ionin, T., Ko, H., & Wexler, K. (2004). Article semantics in L2-acquisition: The role of specificity. *Language Acquisition, 12*, 3–69.

Iwasaki, S. & Ingkaphirom, P. (2009). *A reference grammar of Thai*. Cambridge: Cambridge: University Press.

Jaeger, T.F. (2008). Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of Memory and Language, 59*, 434-446.

Jarvis, S. (2002). Topic continuity in L2 English article use. *Studies in Second Language Acquisition, 24*, 387–418.

Jia, G. (2003). The acquisition of the English plural morpheme by native Mandarin Chinese-Speaking children. *Journal of Speech, Language, and Hearing Research, 46* (6), 1297–1311.

Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology, 21* (1), 60–99.

Kan, I.P., & Thompson-Schill, S.L. (2004). Effect of name agreement on prefrontal activity during overt and covert picture naming. *Cognitive, Affective and Behavioral Neuroscience, 4* (1), 43–57.

Krashen, S. (1977). The Monitor Model for adult second language performance. In M. Burt, H. Dulay, and M Finocchiaro (Eds.), *Viewpoints on English as a second language*, pp. 152–161. New York: Regents.

Kroll, J.F., & Stewart, E. (1994). Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language, 33,* 149–174.

Kuribara, C. (1999). Resettability of a syntactic parameter: acquisition of category D in English by adult Japanese speakers. In P. Robertson (Ed.) Representation and process: Proceedings of the 3rd Pacific Second Language Research Forum, Vol 1, pp.13–22. Tokyo: PacSLRF.

Laaha, S. & Gillis, S. (Eds.) (2007). Typological perspectives on the acquisition of noun and verb morphology. *Antwerp papers in linguistics, 112*.

Lardiere, D. (2003). Second language knowledge of [+/-Past] and [+/-Finite]. In J. M. Liceras, H. Zobl, & H. Goodluck (Eds.), *Proceedings of the 6th Generative Approaches to Second Language Acquisition Conference (GASLA 2002)* (pp. 176–189). Somerville, MA: Cascadilla Proceedings Project.

Lardiere, D. (2009). Further thoughts on parameters and features in second language acquisition. *Second Language Research, 25* (3), 409–422.

Leung, Y. (2002). *Functional categories in second and third language acquisition: A crosslinguistic study of the acquisition of English and French by Chinese and Vietnamese speakers* (PhD dissertation, McGill University).

Lew-Williams, C., & Fernald, A. (2007). Young children learning Spanish make rapid use of grammatical gender in spoken word recognition. *Psychological Science, 18*, 193–198.

Lombardi, L., & Potter, M. C. (1992). The regeneration of syntax in short term memory. *Journal of Memory and Language, 31***,** 713–733.

Lu, C.F.-C. (2001). The acquisition of English articles by Chinese learners. *Second Language Studies, 20*, 43–78.

Luk, Z. P., & Shirai, Y. (2009). Is the acquisition order of grammatical morphemes impervious to L1 knowledge? Evidence from the acquisition of plural *-s*, articles and possessive *'s*. *Language Learning, 59,* 721–754.

MacDonald, M. C., Pearlmutter, N. J., & Seidenberg, M. S. (1994). Lexical nature of syntactic ambiguity resolution. *Psychological Review, 101*, 676–703.

Mackey, A. & Gass, S. (2005). *Second language research methodology and design.* Mahwah, N.J.: Lawrence Erlbaum Associates.

MacWhinney, B. (2005). A unified model of language acquisition. In J. F. Kroll & A. M. B. de Groot (Eds.) *Handbook of bilingualism: Psycholinguistic approaches*, pp. 49–67. Oxford: Oxford University Press.

Marian, V., & Spivey, M. (2003). Bilingual and monolingual processing of competing lexical items. *Applied Psycholinguistics, 24,* 173–193.

Mellow J., & Cumming, A. (1994). Concord in interlanguage: Efficiency or priming? *Applied Linguistics, 15* (4), 442–73.

Narasimhan, B., & Dimroth, C. (2008). Word order and information status in child language. *Cognition*, *107*, 317-329.

Pongpairoj, N. (2008). *Variability in second language article production: a comparison of L1 Thai and L1 French learners of L2 English* (PhD dissertation, University of York).

Potter, M.C., & Lombardi, L. (1998). Syntactic priming in immediate recall of sentences. *Journal of Memory and Language, 38*, 265–282.

Ramscar, M., Dye, M., & McCauley, S.M. (2013). Error and expectation in language learning: The curious absence of *mouses* in adult speech. *Language, 89*, 760-793.

Ringbom, H. (1987). *The role of the first language in foreign language learning*. Clevedon, UK: Multilingual Matters.

Robertson, D. (2000). Variability in the use of the English article system by Chinese learners of English. *Second Language Research, 16*, 135–172.

Runqvist, E., Gollan, T. H., Costa, A., & Ferreira, V. S. (2013). A disadvantage in bilingual sentence production modulated by syntactic frequency and similarity across languages. *Cognition, 129*, 256–263.

Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month old infants. *Science, 274*, 1926–1928.

Sarko, G. (2009). L2 English article production by Arabic and French speakers. In R. Hawkins & M .P. G. Mayo (Eds.), *Second language acquisition of articles: Empirical findings and theoretical implications* (pp. 37-66). Amsterdam: John Benjamins.

Seidenberg, M.S., & MacDonald (1999). A probabilistic constraints approach to language acquisition and processing. *Cognitive Science, 23*, 569-588.

Sharma, D. (2005). Language transfer and discourse universals in Indian English article use. *Studies in Second Language Acquisition, 27,* 535–566.

Shin, J.-A., & Christianson, K. (2009). Syntactic processing in Korean-English bilingual production: Evidence from cross-linguistic structural priming. *Cognition, 112*, 175-180.

Snape, N. (2006). *The acquisition of the English determiner phrase by Japanese and Spanish learners of English* (Ph.D. dissertation, University of Essex).

Thompson-Schill, S.L., D'Esposito, M., Aguirre, G.K., Farah, M.J. (1997). Role of left inferior prefrontal cortex in retrieval of semantic knowledge: A reevaluation. *Proceedings of the National Academy of Science, 94*, 14792-14797.

Tomlin, R. (1995). Focal attention, voice, and word order: An experimental, cross-linguistic study. In P. Downing & M. Noonan (Eds.), *Word order in discourse* (pp. 517–554). Dordrecht: Reidel.

Trenkic, D. (2002). Form-meaning connections in the acquisition of English articles. In S. Foster-Cohen, T. Ruthenberg, & M. Poschen (Eds.), *EUROSLA Yearbook 2* (pp. 115–133). Amsterdam: John Benjamins.

Trenkic, D. (2007). Variability in L2 article production: Beyond the representational deficit vs. processing constraints debate. *Second Language Research, 23*(3), 289–327.

Trenkic, D. (2008). The representation of English articles in second language grammars: Determiners or adjectives? *Bilingualism: Language and Cognition, 11*(1), 1–18.

Trenkic, D. (2009). Accounting for patterns of article omissions and substitutions in second language production. In R. Hawkins & M .P. García Mayo (Eds.), *Second language acquisition of articles: Empirical findings and theoretical implications* (pp. 115–143). Amsterdam: John Benjamins.

Trenkic, D., & Pongpairoj, N. (2013). Referent salience affects second language article use. *Bilingualism: Language and Cognition, 16*(1), 152–166.

Trenkic, D., Mirkovic, J., & Altmann, G. (2013). Real-time grammar processing by native and non-native speakers: Constructions unique to the second language. *Bilingualism: Language and Cognition*, available on CJO2013. doi:10.1017/S1366728913000321.

Trueswell, J. C., & Tanenhaus, M. K. (1994). Toward a lexicalist framework of constraint-based syntactic ambiguity resolution. In C. J. Clifton, L. Frazier, & K. Rayner (Eds.), Perspectives on sentence processing (pp. 155–179). Hillsdale, NJ: Lawrence Erlbaum Associates.

Tryzna, M. (2009). Questioning the validity of the Article Choice Parameter and the Fluctuation Hypothesis: Evidence from L2 English article use by L1 Polish and L1 Mandarin Chinese speakers. In R. Hawkins & M .P. García Mayo (Eds.), *Second language acquisition of articles: Empirical findings and theoretical implications* (pp. 67–86). Amsterdam: John Benjamins.

Vinther, T. (2002). Elicited imitation: A brief overview. *International Journal of Applied Linguistics, 12*, 54-73.

Weber, A., & Cutler, A. (2004). Lexical competition in non-native spoken-word recognition. *Journal of Memory and Language, 50,* 1–25.

White, L. (2003). Fossilization in steady state L2 grammars: Persistent problems with inflectional morphology. *Bilingualism: Language and Cognition, 6,* 129–141.

White, L. 2008. Some puzzling features of L2 features. In J. Liceras, H. Zobl, & H. Goodluck (Eds.), *The role of features in second language acquisition* (pp. 301–326). Mahwah, NJ: Lawrence Erlbaum.

Yeni-Komshian, G. H., Robbins, M., & Flege, J. E. (2001). Effects of word class differences on L2 pronunciation accuracy. *Applied Psycholinguistics*, *22* (3), 283–299.

Young, R. (1991). Variation in interlanguage morphology. New York: Peter Lang Publishing.

Young, R. (1995). Form-function relations in articles in English interlanguage. In R. Bayley & D. R. Preston (Eds.), *Second language acquisition and linguistic variation* (pp. 135–175). Amsterdam: John Benjamins.

Žegarac, V. (2004). Relevance theory and 'the' in second language acquisition. *Second Language Resea*rch, 20 (3), 193–211.

Appendix: Story texts

(a) definite plural; bare plural

#1
My friend Mary has a new shop in a pretty village.
She sells items which are difficult to find anywhere else.
She keeps seven hats from Mexico on a high shelf in her shop.
She often shows them to her customers when they enter.
And she cleans ***the hats*** very carefully after they leave.
She also sells ***pots*** for use in restaurants and cafes.
Mary has many lovely products for sale in her little shop.
But nobody buys them because they're very expensive.

#2
Billy used to work as a dishwasher in a large restaurant.
Late one evening, he washed six pans for his boss quite badly.
After that, he dried them extremely carelessly as well.
Then he dropped ***the pans*** very loudly and made a huge mess.
His boss was really furious with him and fired him at once.
So Billy had to find another way to make a living.
Nowadays he sells ***planes*** from Russia and earns lots of money.
He's glad he doesn't work as a dishwasher anymore.

(b) bare plural; definite plural

#3
Wendy's a nice old woman who really likes to entertain kids.
She can sing ***songs*** from lots of different countries quite nicely.
Wendy also likes to do juggling for her audience.
She can juggle five cups very skilfully and safely.
She can also catch them easily and amaze everyone.
She can balance ***the cups*** very carefully on her nose too.
Wendy's husband wants her to retire soon, but she won't.
She loves to make everyone feel happy, so she keeps working.

#4
Last month, Sammy decided to build a new house for himself.
At first, he wanted to use ***bricks*** from India for his house.
But eventually he decided to use wood instead.
So he chose ten trees very carefully from a forest nearby.
After that, he managed to chop them down with an old axe.
Next, he had to cut ***the trees*** very slowly into planks.
Then Sammy built his new house in only about one week.
He's having a big party there tomorrow to celebrate.

(c) definite plural; definite singular

#5
My son Eddy has some really expensive things in his office.
He has nine fans from Vietnam with gold and silver trim.
He received them from his grandmother as a wedding gift.
He cleans ***the fans*** very often when he isn't busy.
Eddy also keeps a pen covered in beautiful jewels there.
He purchased it when he went overseas on holiday.
He often uses ***the pen*** for writing letters to his girlfriend.
Soon, Eddy's going to install a lock on his office door.

#6
Danny went hiking in a forest by himself last summer.
First of all, he reached two lakes filled with very muddy water.
He tried to find them on a dirty map in his pocket.
But he couldn't see ***the lakes*** very easily at all.
Then Danny found a track which was covered in plants and weeds.
He started to clear it quickly with a sharp machete.
Next, he followed ***the track*** very carefully for two hours.
Just before sunset, Danny finally arrived home safely.

(d) definite singular; definite plural

#7
Jenny went to a toy shop to buy presents for her son.
First of all, she purchased a drum which was made in Korea.
A shop assistant wrapped it for her in colourful paper.
Jenny decided to buy ***the drum*** because her son likes music.
After that, she bought four trucks for him to play with as well.
Jenny chose them because he loves playing with toy vehicles.
She put ***the trucks*** very carefully into a lovely bag.
But her son didn't like anything that she had bought for him.

#8
Tommy found some interesting things while digging in a field last month.
First of all, he discovered a plate made of beautiful stone.
He noticed it in some thick brown mud near a very big rock.
Tommy cleaned ***the plate*** very gently with a piece of cloth.
After that, he found ten hooks for catching fish in rivers.
Then he put them in an airtight bag to keep moisture out.
Later, he examined ***the hooks*** very carefully in his lab.
Tommy thinks he's discovered an ancient village in this field.

(e) bare plural; definite singular

#9
Benny has an antique shop in a busy street not far from here.
He sells ***clocks*** from Peru and other beautiful items.
On Friday night, a woman in a mask rushed into his shop.
She was holding a gun and shouting extremely loudly.
Then she pointed it at Benny and demanded all his money.
Benny grabbed ***the gun*** from her very quickly but safely.
She tried to get away, but a policeman arrested her.
Later, Benny thanked him very warmly for his assistance.

#10
Frank makes ***pins*** for a living in a factory in Germany.
His salary is very low, so he doesn't have much money.
But he's been saving for two years to buy a ring for his girlfriend.
He purchased it last night at a fancy jewellery shop.
He hid ***the ring*** very carefully in a drawer in his house.
Frank and his girlfriend are going on holiday next week.
I think he's going to propose to her while they're away.
And his girlfriend will probably accept his proposal too.

(f) definite singular; bare plural

#11
George lives by himself in a tiny cottage in Scotland.
He only has a cat to keep him company all day and night.
He lets it sleep in a comfortable box next to his bed.
He often tells ***the cat*** very long stories because he's lonely.
Unfortunately, George doesn't have a healthy diet either.
He eats ***nuts*** very often, but never meat or vegetables.
Occasionally, he thinks he should live with his mother again.
But he isn't confident that they could get along well.

#12
Andy likes to keep all kinds of animals in his house.
He keeps a duck on a tiny chair in his living room.
He allows it to sit on his lap and watch TV with him.
He likes ***the duck*** very much because it's easy to live with.
Andy used to keep ***pigs*** from China seven years ago too.
But unfortunately his house wasn't big enough for them.
He used to have a wife, but she left because she felt neglected.
I honestly think Andy prefers animals to humans.